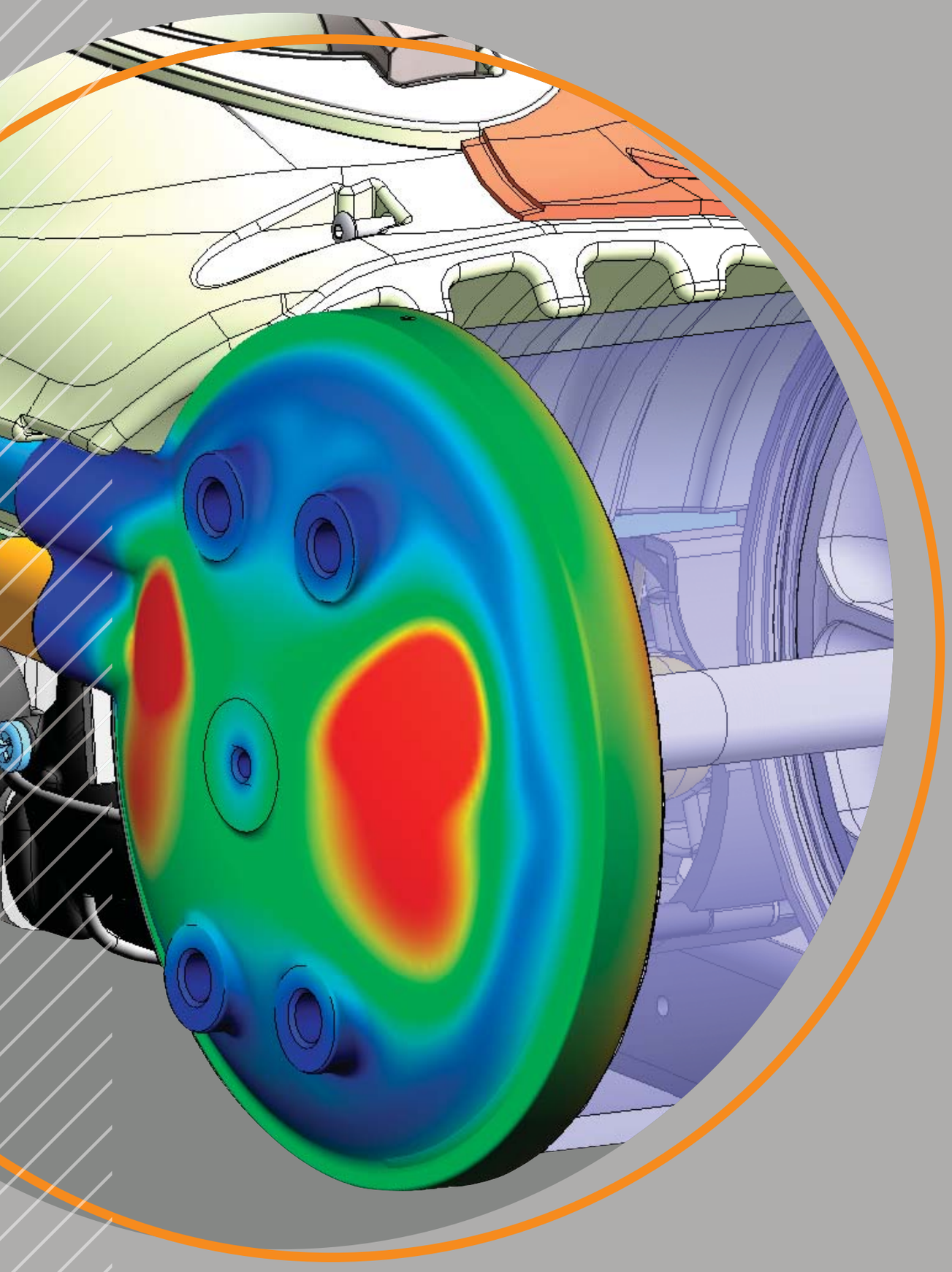
COSMOSWorks

Design Validation Made Simple



SolidWorks

COSMOSWorks Designer

AFFORDABLE DESIGN VALIDATION SOFTWARE FOR EVERY PRODUCT DESIGNER

Use COSMOSWorks® Designer to improve product quality by identifying areas that are prone to weakness and failure. You can also lower costs by trimming excess material and minimizing the need for physical prototypes.

Compare alternative designs easily and quickly. Go beyond simple hand calculations and study different design configurations created with SolidWorks® software and choose the optimal design for final production.

- Study stress, strain, and displacement in parts and assemblies.
- Define analysis inputs such as material, loads, and geometric dimensions using parameters.
- Drag and drop to create and clone analysis studies.

Study the interaction between different assembly components. COSMOSWorks Designer provides powerful tools to study and optimize assemblies of all sizes.

- Bond components with clearances or gaps, without modification.
- Identify contact forces, stresses, and friction for parts that may come into contact during operation.

Simulate real-world operating conditions. COSMOSWorks Designer includes several loads and restraints to represent real-life situations.

- Apply bearing loads, forces, pressures, and torque.
- Transfer forces and restraints from remote locations to parts or assemblies.
- Simulate the effects of gravity forces or forces due to rotation (centrifugal force).

Automate analysis tasks. Automation tools simplify the analysis process to help you work more efficiently.

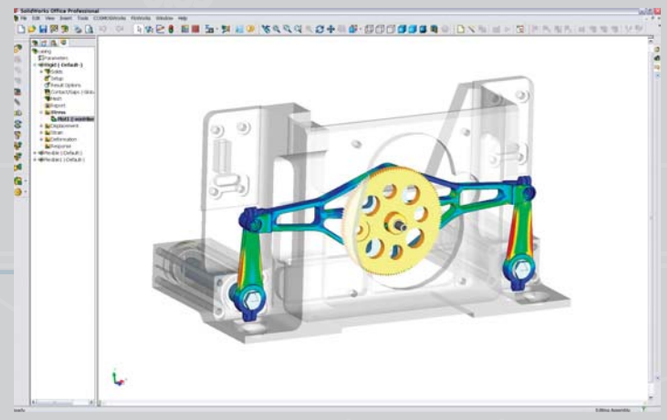
- Mesh both parts and assemblies with custom meshing tools (such as mesh transitioning and local mesh controls) and mesh failure diagnostics tools.
- Converge to accurate solutions by automatically refining and/or coarsening mesh in local areas.

Interpret analysis results with powerful and intuitive visualization tools. After the analysis is complete, results visualization tools provide valuable insight into the performance of your models.

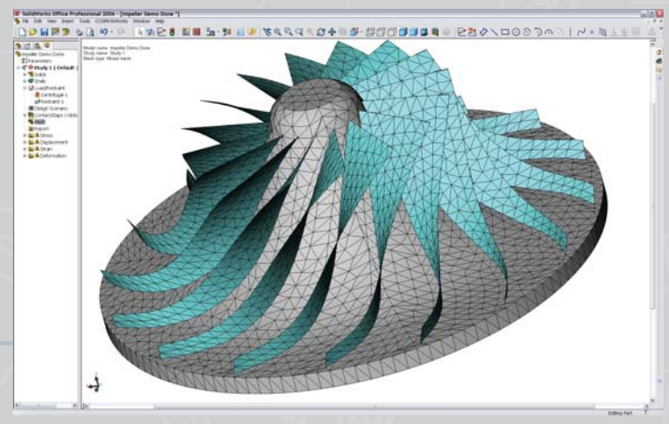
- Study the distribution of result quantities with 3D contour plots (including stress, strain, deformed shape, displacement, energy, error, strain energy, density, and reaction force).
- Determine the factor of safety using the Design Check Wizard.

Collaborate and share analysis results. Now it's easy to collaborate and share analysis results effectively with everyone involved in the product development process.

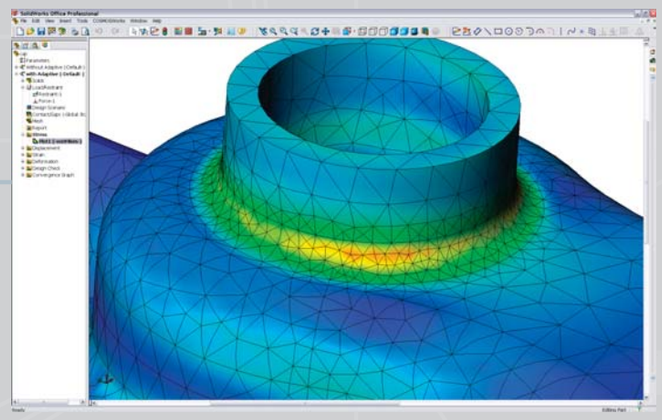
- Generate reports in HTML and Microsoft® Word format.
- Save result plots in VRML, XGL, BMP, and JPEG and export result animations as AVI files.



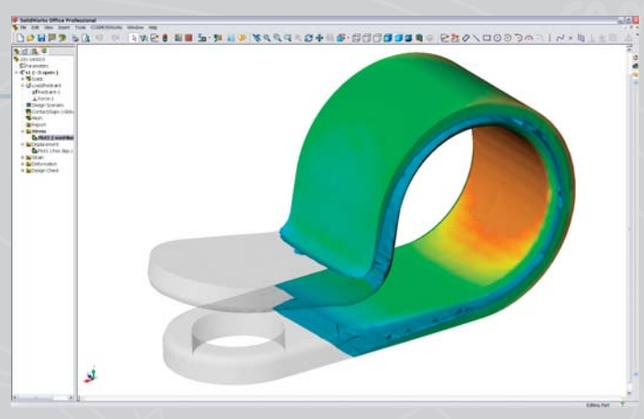
Simulate assembly connections with smart connectors such as pins, springs, bolts, and spot welds.



Analyze assemblies of thick and thin parts with a combination of solid and shell meshes.



Automatically refine and coarsen meshes in local areas based on stress results for more accurate solutions.



Use dynamic section plots to display results along the depth of the model.

COSMOSWorks Professional

POWERFUL DESIGN VALIDATION SOFTWARE FOR PRODUCT DESIGNERS AND ENGINEERS

COSMOSWorks Professional offers a wide spectrum of powerful tools to help engineers who are familiar with design validation concepts to perform virtual testing and analysis of parts and assemblies.

Take your designs to the next level. In addition to the design validation functionality contained in COSMOSWorks Designer, COSMOSWorks Professional offers expanded analysis capabilities including; Thermal, Frequency, Buckling, Optimization, Fatigue, and Drop Test Simulation.

Understand the effects of temperature changes. Temperature variations encountered by mechanical parts and structures can greatly influence product performance.

- Study conduction, convection, and radiation heat transfer.
- Support isotropic, orthotropic, and temperature-dependent material properties.

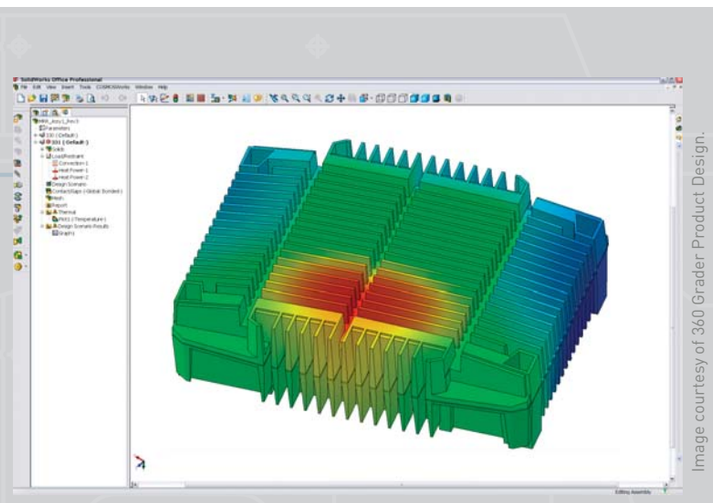
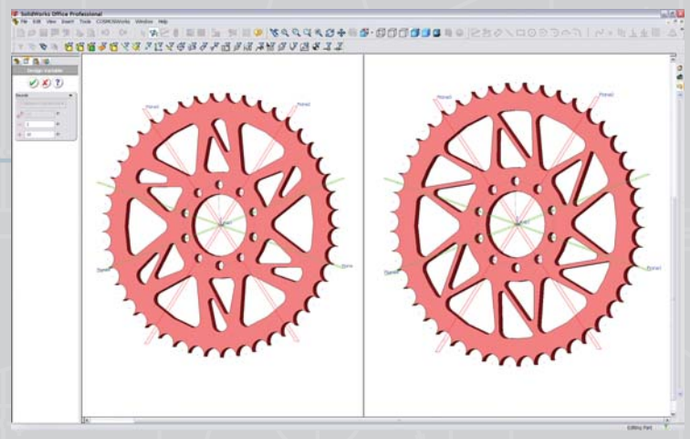


Image courtesy of 360 Grader Product Design.

Analyze steady state heat transfer and transient heat transfer with time-varying boundary conditions.

Evaluate natural frequencies or critical buckling loads and their corresponding mode shapes. Often overlooked, inherent vibration modes in structural components or mechanical support systems can shorten equipment life and cause unexpected failures.

- Study isotropic and orthotropic material behavior.
- Measure inplane effects on stiffness.
- Loads for buckling and inplane stiffening include: force, pressure, gravity, and centrifugal.



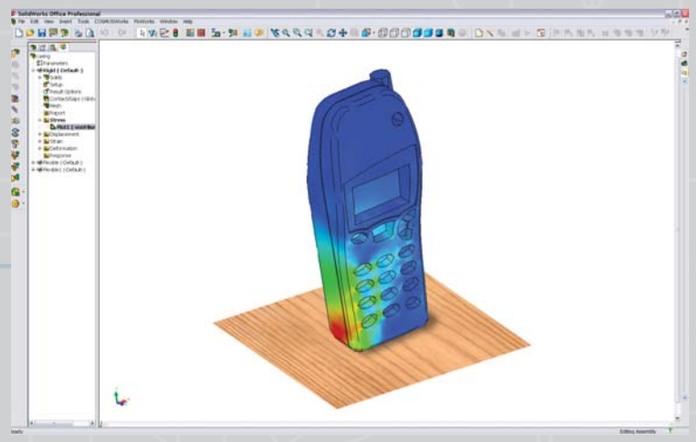
Minimize material usage or weight of your designs using shape optimization technology.

Optimize designs based on your defined criteria. Design optimization automatically determines the most optimal design based on your specified criteria.

- Base constraint criteria on static, thermal, frequency, or buckling analysis.
- Base objective criteria on dimensions, mass, or volume.

Simulate virtual drop tests on a variety of flooring surfaces. In the event that your part or assembly might be dropped, find out whether or not it can survive the fall intact.

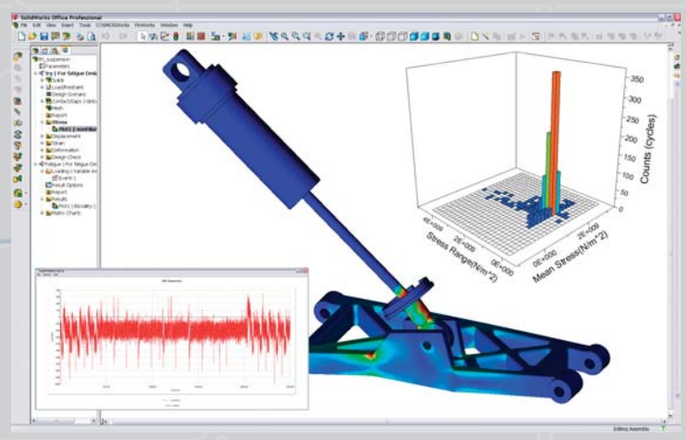
- Simulate the impact onto various rigid and flexible flooring surfaces, such as concrete, carpet, and hard wood.
- See the interactions between various parts in an assembly after impact.



Study stresses, velocity and accelerations when objects are dropped from different heights and orientations.

Study the effects of cyclic loading and fatigue operating conditions. See the effects of fatigue on the overall lifecycle of your part or assembly to find out how long it will last, and what design changes can extend its working life.

- Use rainflow charts to help determine the effects of small stress cycles in loading history and possible effects of infinite life.
- Import load history data from real physical tests to define loading events.



Predict fatigue life/damage of assemblies with components having different material properties and failure characteristics (S-N curves).

COSMOSWorks Advanced Professional

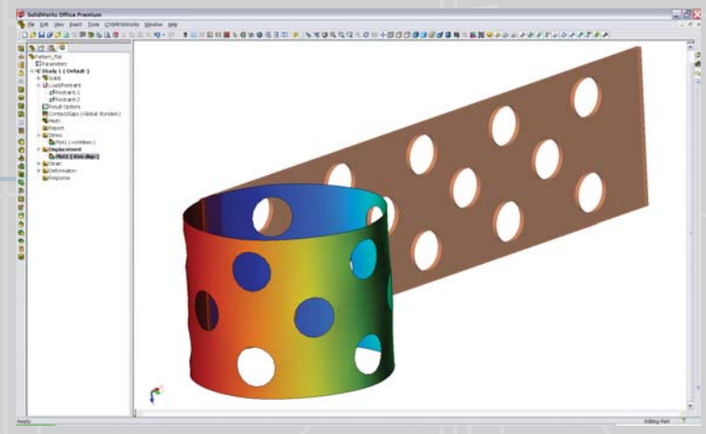
THE COMPLETE DESIGN VALIDATION SOFTWARE FOR EXPERT PRODUCT ENGINEERS

One of the most comprehensive and sophisticated packages available, COSMOSWorks Advanced Professional offers analysts a tremendous range of analysis capabilities at a fraction of the cost of most high-end FEA programs.

The complete design validation software for advanced product engineers. In addition to the design validation functionality contained in COSMOSWorks Professional, COSMOSWorks Advanced Professional offers analysts an expanded selection of analysis capabilities including; Nonlinear, Dynamics, and Composites.

Study nonlinear large displacement behavior of your designs. Quickly solve nonlinear problems due to large deformation and changes in boundary conditions.

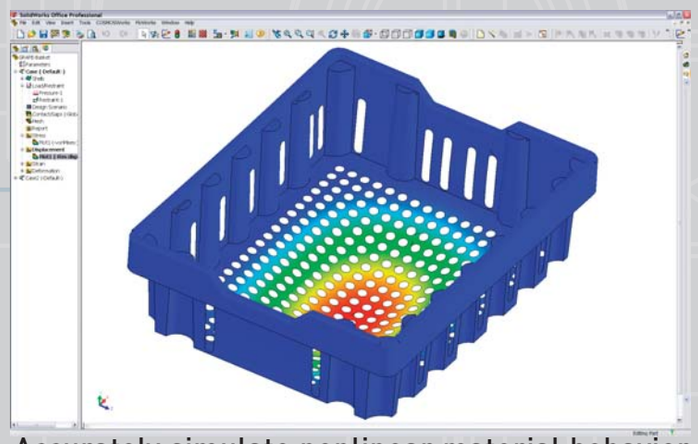
- Transition easily from linear to nonlinear analysis.
- Study nonlinear buckling such as snap-through buckling of diaphragms, switchblades, or soda cans.



Study nonlinear problems due to large deformations and changes in boundary conditions.

Analyze designs made of nonlinear materials. Nonlinear material such as rubber, silicone, or metals under high loads behave differently from standard engineering materials.

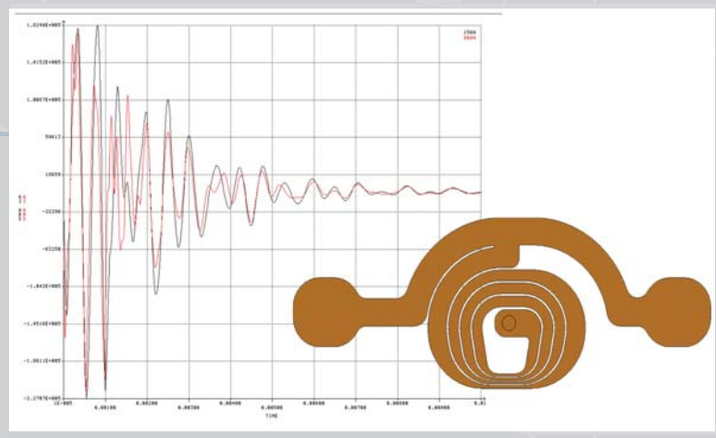
- Optimize design with hyperelastic materials such as rubber, silicone, and elastomers.
- Conduct elastoplastic analysis to study onset of yield as well as post-yield analysis in your designs.
- Include creep effects and material changes with temperature.



Accurately simulate nonlinear material behavior based on various material models.

Perform dynamic analysis of parts and assemblies. Study dynamic response analysis due to time history loading, response spectra input, steady state harmonic input, and random vibration excitations.

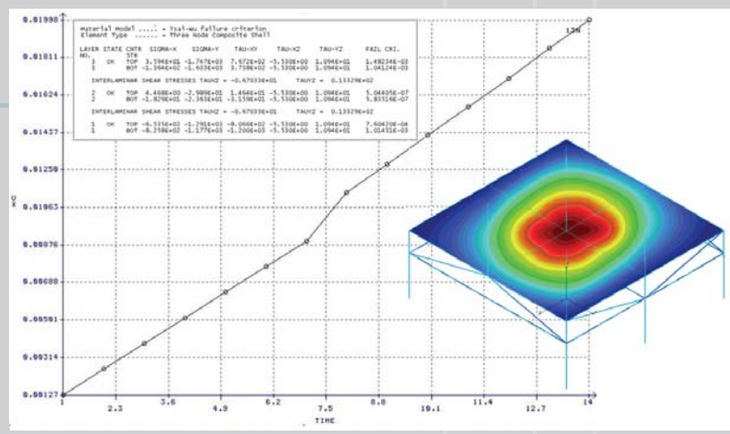
- Utilize uniform and multibase motion systems that allow you to model structures with nonuniform support excitations.
- Input power spectral density (PSD) of excitation curves of forces in random vibration analysis.
- Study stress, displacement, velocity, acceleration with time study RMS and PSD values for stress, displacement, velocity, and acceleration.



Plot accelerations (dynamic response) at specified locations due to time-varying loads.

Analyze layers within composites. Composite materials are used in an increasing number of products ranging from simple consumer goods to advanced aerospace structures.

- Study tri-, quad- and solid multilayer shell elements with membrane and bending capabilities. Each layer can have its own isotropic or orthotropic material properties, thickness, and orientation.
- Utilize sandwich and graphite or carbon fiber composites (such as honeycomb, cellular foams, carbon fiber).



Visualize results for specific layers and interlaminar shear stress, including individual ply failure.

Feature	Designer	Professional	Advanced Professional
GEOMETRY TYPES			
Part analysis	✔	✔	✔
Assembly analysis	✔	✔	✔
Thin parts, sheetmetal parts, shells	✔	✔	✔
Beams, Trusses			✔
ANALYSIS TYPES			
Stress & Displacement	✔	✔	✔
Thermal Stress	✔	✔	✔
Contact analysis in assemblies with friction	✔	✔	✔
Frequency & Buckling		✔	✔
Heat Transfer - Steady State & Transient		✔	✔
Temperature Dependent Materials		✔	✔
Drop Test		✔	✔
Fatigue		✔	✔
Optimization		✔	✔
Nonlinear Stress Analysis			✔
Dynamic Response			✔
Composites			✔
Fluid Flow	+	+	+
Motion Simulation	+	+	+
Electromagnetics	+	+	+
USABILITY			
Multiple Studies, “what if scenarios”	✔	✔	✔
Parameters & Design Tables	✔	✔	✔
Customizable Material Library	✔	✔	✔
ENVIRONMENTS (LOADS/RESTRAINTS)			
Uniform pressure & force on faces	✔	✔	✔
Fixed restraints on faces	✔	✔	✔
Directional & non-uniform pressure & force	✔	✔	✔
Force on edges and vertices	✔	✔	✔
Body loads: gravity & centrifugal	✔	✔	✔
Special loads: torque, remote, bearing	✔	✔	✔
Fixed restraints on edges & vertices	✔	✔	✔
Directional and prescribed restraints	✔	✔	✔
Temperature, convection, radiation, heat power		✔	✔
ASSEMBLY CONNECTORS			
Springs, Elastic Foundation	✔	✔	✔
Pin, Bolts, Rigid, Spot Weld	✔	✔	✔
Thermal Contact Resistance		✔	✔
VISUALIZATION			
Stress plot, deformation, displacement plot	✔	✔	✔
Factor of safety calculation and plot	✔	✔	✔
Principal stress, directional stress, strain plots	✔	✔	✔
Result probing, listings	✔	✔	✔
Dynamic section, iso plots	✔	✔	✔
Scaled plots, superimposed plots, customizations	✔	✔	✔
Resonant frequencies, mode shape plots		✔	✔
Temperature, heat flux plots		✔	✔
ENGINEERING COLLABORATION			
HTML report	✔	✔	✔
Publish eDrawings of analysis results	✔	✔	✔
Animation and save as AVI	✔	✔	✔
Detailed HTML report customizations	✔	✔	✔
Save as bitmap, JPEG, VRML, XGL	✔	✔	✔
Export to other FEA systems		✔	✔

✔ Feature Included
\+ Add-on

Corporate Headquarters

SolidWorks Corporation
300 Baker Avenue, Concord, MA 01742 USA
Phone: +1 800 693 9000
Outside the US: +1 978 371 5011
Fax: +1 978 371 7303
Email: info@solidworks.com

European Headquarters

SolidWorks Europe
201, Route de la Seds
Parc du Relais - Bat. D
13127 Vitrolles, France
Phone: +33 4 42 15 03 85
Fax: +33 4 42 75 31 94
Email: infoeurope@solidworks.com

Latin America Headquarters

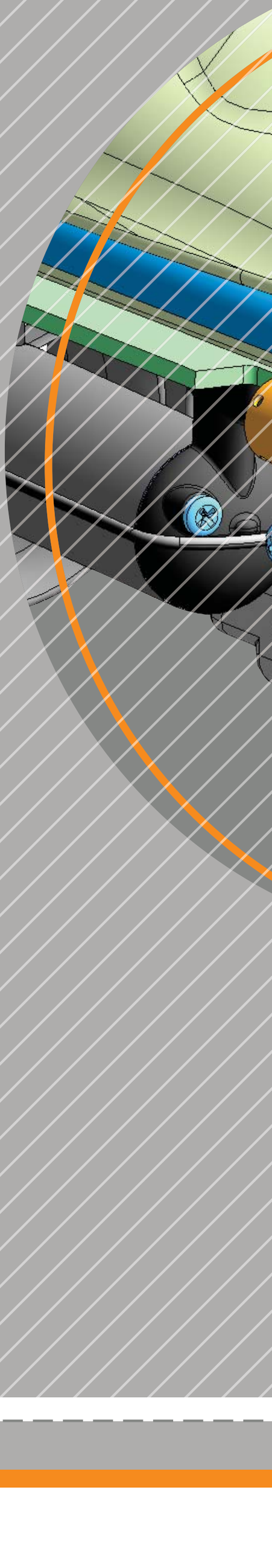
Avenida Cidade Jardim, 400 - 7º andar
São Paulo, SP
Brasil 01454-000
Phone: +55 11 3818 0980
Fax: +55 11 3818-0977
Email: infola@solidworks.com

Asia/Pacific Headquarters

SolidWorks Corporation
Penthouse Level, Suntec Tower Three
8 Temasek Boulevard
Singapore 038988
Phone: +65 6866 3885
Fax: +65 6866 3838
Email: infoap@solidworks.com

For More Information

For more information about COSMOS Analysis Products, contact your local SolidWorks reseller. To find the reseller nearest you, please visit www.solidworks.com. You may also call toll-free at +1 800 469 7287 to speak with a sales representative. If you are calling from outside the US, please dial +1 310 309 2800.



CWRGBENG0505

Cover images courtesy of National Optical Astronomy Observatory, operated by the Association of Universities for Research in Astronomy, under cooperative agreement with the National Science Foundation.

www.cosmosworks.com